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Experiment Station

PRUNING OPEN-GROWN BLACK CHERRY

Abstract. Black cherry trees that had large crown ratios and were 4 to 6 inches d.b.h. were pruned to various heights. Epicormic sprouting was severe and diameter growth at breast height was reduced on trees pruned to 75 percent of their height. Most trees pruned to 50 percent show little or no adverse effect after 3 years.

There are many thousands of acres of poorly stocked black cherry (*Prunus serotina* Ehrh.) stands on the Allegheny Plateau. Most of these stands contain scattered young fast-growing and well-formed trees that are heavily-branched because of the open growing conditions. If left alone, these trees will produce low-quality lumber. In some of these stands with low stocking, it has been necessary to sacrifice existing trees in an attempt to regenerate a fully stocked stand. However, pruning provides a means of salvaging these trees and developing stands of high potential value.

Pruning may also have an important place in the future management of black cherry. The possibilities of very intensive culture are now being considered whereby some cherry on the best sites might be grown at wide initial spacings to facilitate cultivation, fertilization, and even irrigation. To get production of high-quality veneer logs on as short a rotation as possible, pruning would be a key treatment.

In 1962 a study was established to determine the effects of different intensities of pruning on the growth and quality of open-grown black cherry trees. Preliminary results based on 3 years' observations are presented here.

The Study

Scattered black cherry trees in areas on the Marienville District, Allegheny National Forest, were selected for pruning. Trees between 4 and 6 inches in diameter, reasonably straight, free of forks, and with a live crown ratio of about 75+ were selected (figure 1). Tree heights ranged from 23½ to 45½ feet; the average was 35 feet. Live crown ratio actually averaged 83 percent, and ranged from 73 to 92 percent.

A total of 48 trees were used in the study—16 trees each in the 4-, 5-, and 6-inch diameter classes. Equal numbers in each diameter class were randomly assigned to one of four treatments. The treatments and the percent of live crown removed were:

Treatment	*Percent of live crown removed* (*average*)	(*range*)
No pruning	0	0
Pruning to 25 percent of total height	13	0-19
Pruning to 50 percent of total height	42	37-49
Pruning to 75 percent of total height	71	66-75

The trees were pruned in July and early August 1962. Branches were diagrammed to show: (1) their location on each of four faces, (2) whether live or dead at the time of pruning, (3) whether pruned or not pruned, and (4) their diameter to the nearest half inch just above the basal swell. All branches on the first 17 feet of all trees were diagrammed as were all pruned branches on trees pruned higher than 17 feet. In all, 988 branches were pruned; these and 513 branches that were left unpruned are under observation. The 585 live branches that were pruned averaged 1.0 inches in diameter, and the dead branches pruned averaged just over 0.6 inches.

Although the width of pruning wound may be more closely correlated with the rate of healing, the size of branch was used as a variable in this study because it can be measured before pruning; it describes unpruned branches as well as pruned ones, and it could be used to prescribe the upper limit of branch size to prune.

Diameter at breast height and total height of the trees was measured at the time of pruning. Diameters were remeasured each year and heights were remeasured after 2 years. Measurements were taken at the beginning of August. The pruning wounds and diagrammed branches are being observed each year to determine the dates of wound healing and natural pruning. The number and estimated length of epicormic branches is being recorded by 4-foot heights each year. The study will be continued for a few years after the pruning wounds have healed; some dissections will then be made to study wood quality.

Figure 1.—A promising 6-inch open-grown black cherry tree immediately after pruning to 17 feet — half its total height.

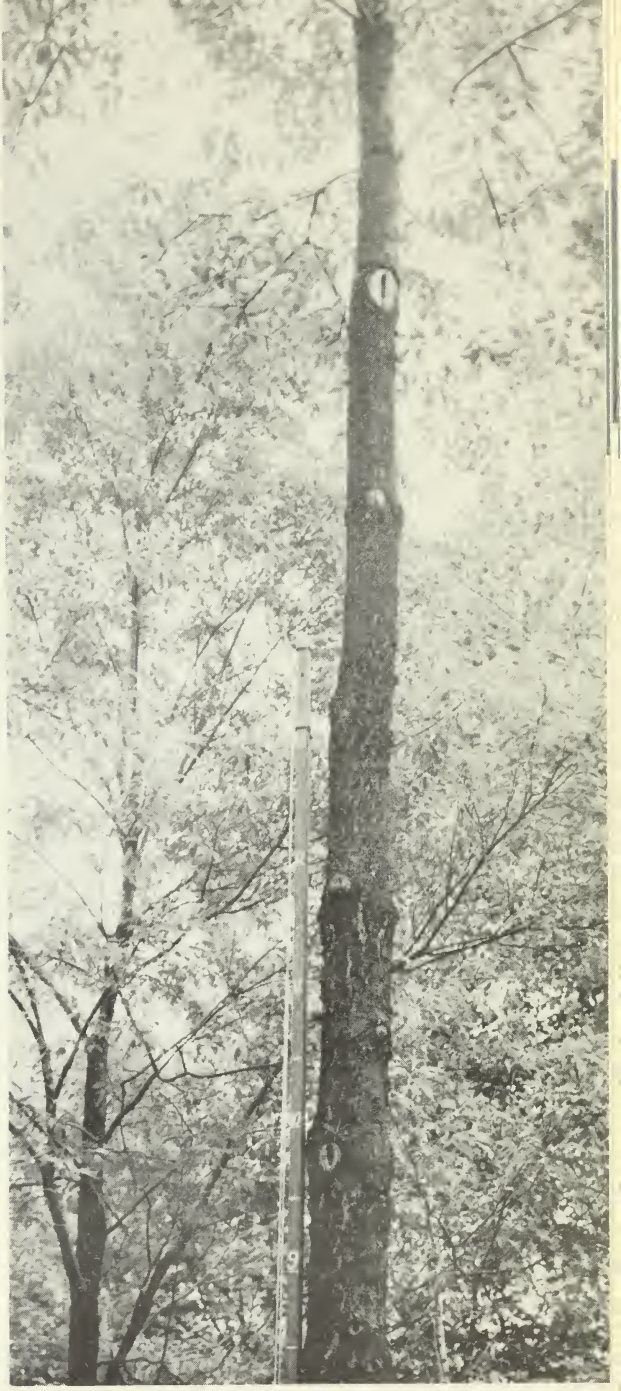

Figure 2.—Wound healing and freedom from epicormic branches after 3 years. This tree was 6 inches in diameter when pruned to 50 percent of its height. All pruned branches more than 9 feet above the ground on this side were alive and 1 or 1½ inches in diameter.

Results

Diameter growth.—Diameter growth at breast height was reduced by the most severe pruning treatment—pruning to 75 percent of the total height—but was affected very little, if any, by the other treatments. The difference due to the 75 percent treatment was highly significant, statistically. Differences among the other treatments were not significant. This is true for each year as well as for the three years combined. Average annual and total diameter growth by treatments are shown in table 1.

Height growth.—Height growth on the trees pruned to 50 and 75 percent of their height was slightly greater than on the other trees, but the difference was not significant. The unpruned trees and those pruned 25 percent grew 2.0 and 2.1 feet in height, respectively, in the first 2 years after pruning. Trees pruned 50 percent and 75 percent had average increases in height of 2.7 feet during the same period.

Epicormic branching.—Within a year after pruning it became obvious that epicormic branching would limit the intensity of pruning. After 1 year, trees pruned 75 percent had an average of 35 sprouts that averaged nearly two feet in length (table 2). Sprouting was very light on the 50-percent trees, and practically nil on the others. There was some sprouting even on the unpruned trees and, later, in the unpruned portion of the first 17 feet of some trees pruned to 25 percent. Epicormic sprouts that survive negate the benefits of pruning, of course. Their lengths are an indication of their vigor and chances of surviving. No tests have been made of the possibility of eliminating these sprouts with a second pruning or by other means, such as chemicals. It seems likely that a second pruning would eliminate the weaker sprouts.

In general, epicormic branches have increased both in number and in length since the first year. The slight decline in number on the most severe treatment was the exception.

Table 1.—*Diameter growth at breast height, by treatment and year, in inches*

Year	Percent of height pruned			
	0	25	50	75
1962-1963	0.28	0.27	0.23	0.10
1963-64	.30	.30	.27	.13
1964-65	.23	.25	.24	.13
Total	0.81	0.82	0.74	0.36

Table 2.—*Average number and length of epicormic sprouts on unpruned trees up to 17 feet and on the pruned portion of others*

Treatment	Epicormic branches					
	1963		1964		1965	
	Number	Length	Number	Length	Number	Length
	No.	*Feet*	*No.*	*Feet*	*No.*	*Feet*
0	0.3	0.9	0.2	1.8	0.2	2.0
25	0	0	.2	.5	.2	.5
50	1.9	1.5	3.3	2.0	4.6	2.4
75	35.2	1.8	32.4	2.8	31.5	2.9

Individual trees vary considerably in their sprouting characteristics. For instance, 2 of the heavily pruned trees had only 6 and 10 unusually short epicormic branches after 3 years, even though the average tree had 31.5. Most of the epicormic branches on trees pruned 50 percent were small and weak. However, one tree had nine sprouts that averaged nearly 6 feet in length. Without this tree, the average length of sprouts for the treatment would have been 1.2 feet instead of 2.4 feet.

Epicormic sprouts tend to be most vigorous on the middle and upper parts of the pruned portion while weak or dead sprouts are more likely to be found near the base. Again, there are exceptions to this among individual trees.

Besides pruning intensity, the amount of exposure appears to influence the degree of sprouting. No records were made of the orientation of epicormic sprouts, but from observation it is apparent that they are most numerous on the southwest half of the trunk, particularly if they are not closely shaded on that side. They are sometimes confined to one face (quarter); this tends to keep the loss in wood quality at a minimum.

Branch wound healing.—Wounds that resulted from pruning are healing fairly fast (figure 2). Three years after pruning, 42 percent of the wounds under observation had healed. Healing was complete on some smaller scars after the first year and increasing numbers have become closed since then. Some scars from branches 1½ inches in diameter have healed. The 50-percent pruning treatment had the highest proportion of wounds healed (51 percent), but this proportion did not vary greatly among treatments.

The numbers of branches healed and not healed were compared for several 4-foot stem sections. For wounds of a similar size, significantly more had healed on the upper stem sections. Since diameter growth

rate has a major influence on healing rate, this is probably a reflection of the greater diameter growth that takes place near the base of the remaining crown.

Apparent differences that appeared in healing rates between live and dead branch wounds were actually due to other factors. As a group, dead branches were smaller than live ones, and thus the wounds healed faster. But when branches of similar size were compared, it was found that wounds on live branches tended to heal faster than wounds on dead branches. This can be explained by the fact that live branches tended to be located near the tree crown while dead branches were low on the trunks. For live and dead branch wounds of the same size and position, there was no evidence of any difference in healing rate.

Cambium dieback has not been a problem. Only 11 of the hundreds of pruning scars had noticeable dieback; and it usually occurred in a V-shaped area under the pruning wound. Because healing takes place from the sides, dieback should have little or no effect on the rate of healing. In a couple of cases where pruning wounds were very close together, the cambium between them died, making one larger wound.

Smooth young black cherry bark is very susceptible to wounding. At first the flat rung of the metal ladder caused wounds that resulted in extensive dieback, but this was prevented by padding the ladder. The cambium was also killed in places where the sawteeth dragged against the bark.

Pruning methods.—Pruning methods and costs were not tested in this experiment. Pole pruners were used in the beginning but it was difficult to apply pressure, to handle the saw in whorls of branches, or to saw close and parallel to the stem in all cases. Light metal extension ladders were later substituted for the pole pruners: a 16-foot ladder was used for trees pruned to 50 percent of their height and a 40-foot ladder for those pruned to 75 percent. A Meylan pruning saw (blade mounted on an ax handle) was fine for limbs within ground reach.

Conclusions

Although heavy pruning caused a reduction in diameter growth, it is epicormic branching that is most important in limiting the height of pruning. Trees pruned to 75 percent of their height sprouted excessively, nullifying the benefits of the pruning. However, pruning up to 50 percent of tree height can be accomplished on most trees with little adverse effect from either branching or growth reduction. Most wounds appear to be healing rapidly. Pruning of open-grown black cherry promises to

be an important tool for improving the quality and value of poorly stocked stands.

Recommendations

Trees similar to those used in this study could be pruned up to 50 percent of their height in one operation, unless the tree is exposed on the south or west side and has three quarters or more of its height in live crown. In all cases, it will be a matter of judging how high pruning can be done without causing serious epicormic branching.

The decision should be based on the exposure and the number and vigor of branches to be removed. Pruning vigorous branches or branches that shade the upper part of the stem probably increases the chances of stimulating epicormic sprouting. It might even be practical, in some cases, to retain more limbs on the exposed side of a stem and to prune higher on the shaded side. On trees with smaller crown ratios, located in less exposed situations, it would be possible to prune 50 percent of the total height.

Since a large proportion of the total tree value in black cherry is contained in the butt log, it will usually be desirable to limit pruning to the first 1 or 1½ logs, from which economic returns will be greatest. This practice will also permit the maintenance of a large crown to sustain rapid growth as the tree matures—an important requisite in any intensive cherry culture.

Care should be taken not to wound or strip the bark when pruning. Pruning cuts should be as close to the stem as possible, but need not—and probably should not—be made into the cambium surrounding the base of the limb.

After a few years it may be desirable to return and prune some of the same trees to gain more clear length, and to prune any epicormic branches that may have developed since the first pruning.

—T. J. GRISEZ
Associate Silviculturist
Northeastern Forest Experiment Station
Forest Service, U. S. Dep. Agriculture
Warren, Pa.